DICHOTOMOUS KEY TO THE TADPOLES OF TWELVE ANURAN SPECIES FROM NORTH EASTERN INDIA[1]

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(With a map and twelve text-figures)

Key words: dichotomous key, anuran tadpoles, larval systematics, ontogeny, morphology

A dichotomous key to the tadpoles of *Leptobrachium hasselti* Tschudi; *Leptobrachium nigrops* Berry and Hendrickson; *Bufo melanostictus* Schneider; *Microhyla ornata* (Dum. and Bibr.); *Rana alticola* Boulenger; *Rana danieli* Pillai and Chanda; *Rana limnocharis* Weigmann; *Rana cyanophlyctis* Schneider; *Amolops afghanus* (Gunther); *Philautus cherrapunjiae* Roonwal and Kripalani; and Rhacophoridae; *Rhacophorus leucomystax* (Kuhl) and *Rhacophorus nigropalmatus* Boulenger at stages 36-38 (Gosner 1960) has been presented. The characters incorporated in the key are: oral disc, rostrodonts, keratodonts, presence or absence of oral papillae, poison gland or parotid gland, tail ocelli, ventral sucker, nostril shape, presence or absence of rim around the nostrils, presence or absence of depressions, and papillae, position of vent whether dextral or median and position of spiracle whether sinistral or median.

INTRODUCTION

Adult anurans of Indian Sub-continent are relatively well known (Boulenger 1918, 1920; Daniel 1975, Rao 1918) but studies on their tadpoles have lagged behind mainly due to the difficulty of correct identification. 40 anuran species belonging to Pelobatidae, Bufonidae, Hylidae, Microhylidae, Ranidae and Rhacophoridae have so far been reported from North Eastern India (Pillai and Chanda 1976). With increasing thrust these days on ecological, developmental and phylogenetic studies of anurans a knowledge of larval systematics has become essential.

Tadpoles form an important developmental stage in the ontogeny of anurans. Anuran tadpoles are identified by their unique distinguishing characteristics: compact head and trunk united with short vertebral column, gills and forelimbs concealed under operculum, long spirally coiled intestine and internal supporting structures of mouth and gills displaced forward and small mouth usually with elaborate external features (Orton 1953).

Amongst the earliest works, reference may be made to the description of 10 anuran species from Travancore (Ferguson 1904). Works on the tadpoles from India are brief and not based on uniform diagnostic features (Annandale 1912, Annandale and Rao 1918, Annandale and Hora 1922, Hora 1923, Kripalani 1952, Pillai and Chanda 1976, Rao 1918, Roonwal and Kripalani 1961, Swammerdam 1737, Smith 1927). Eversince the work on tadpole mouthparts, various aspects of tadpole morphology and polymorphism have been studied by different workers (see Van Dijk 1966 for review). Some of these works include detailed key to anuran larvae (Altig 1970, Van Dijk 1966, Kripalani 1952, Orton 1952, Mansukhani and Murthy 1971).

In the present paper a key to the tadpoles of 12 anuran species belonging to 5 families, namely Pelobatidae: *Leptobrachium hasselti*, Tschudi, *Leptobrachium nigrops* Berry and Hendrickson; Bufonidae: *Bufo melanostictus* Schneider; Microhylidae: *Microhyla ornata* (Dum. and Bibr.); Ranidae: *Rana alticola* Boulenger, *Rana danieli* Pillai and Chanda, *Rana limnocharis* Weigmann, *Rana cyanophlyctis* Schneider, *Amolops afghanus* (Gunther) and Rhacophoridae: *Philautus cherrapunjiae* Roonwal and Kripalani and *Rhacophorus leucomystax* (Kuhl) and *Rhacophorus nigropalmatus* Boulenger at stages 36-38 (Gosner 1960) has been presented. Further, for easy identification of the above tadpoles, a diagrammatic key is also included here. Body length was found to show considerable variations and hence not taken as a key character.

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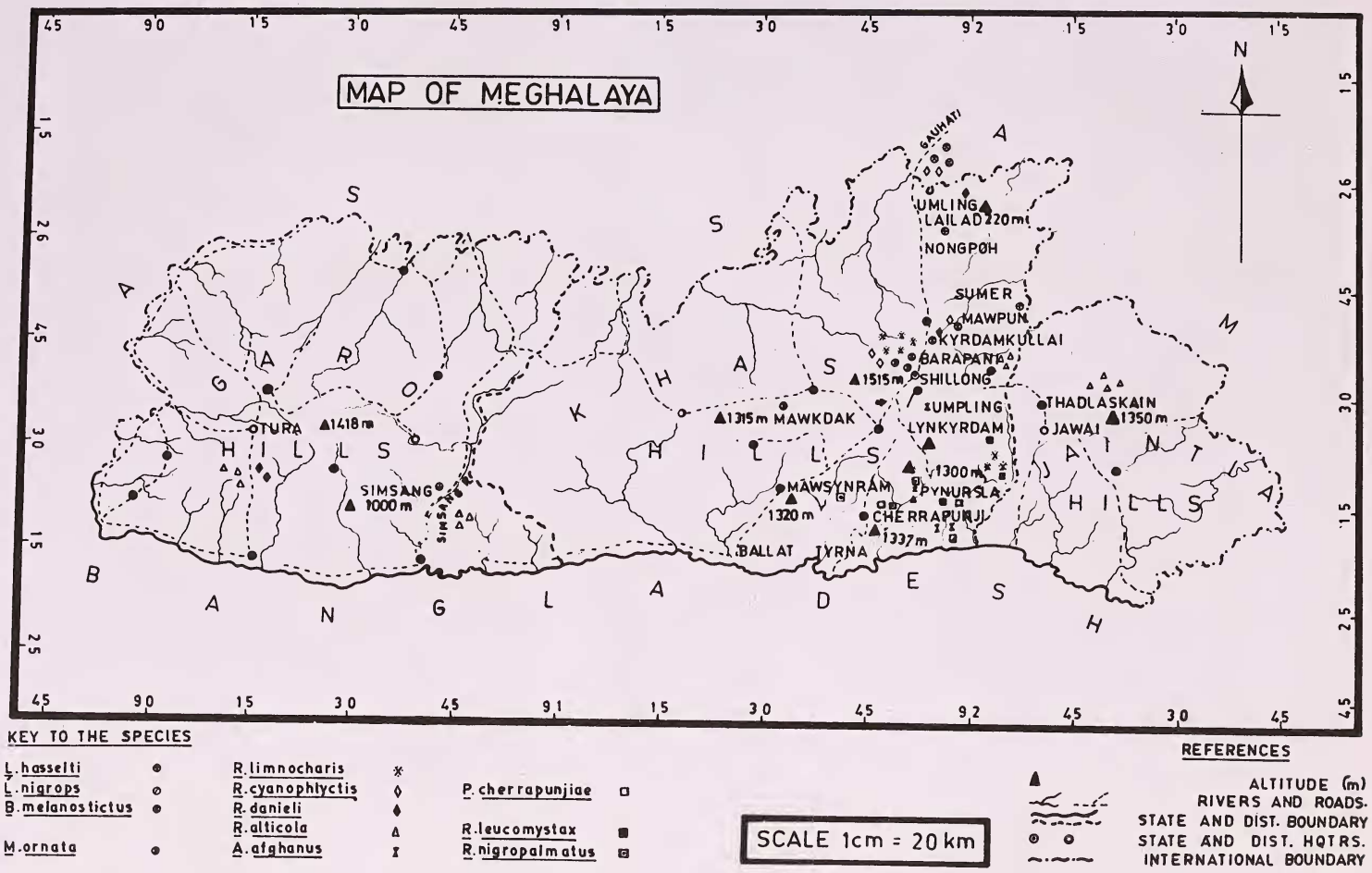
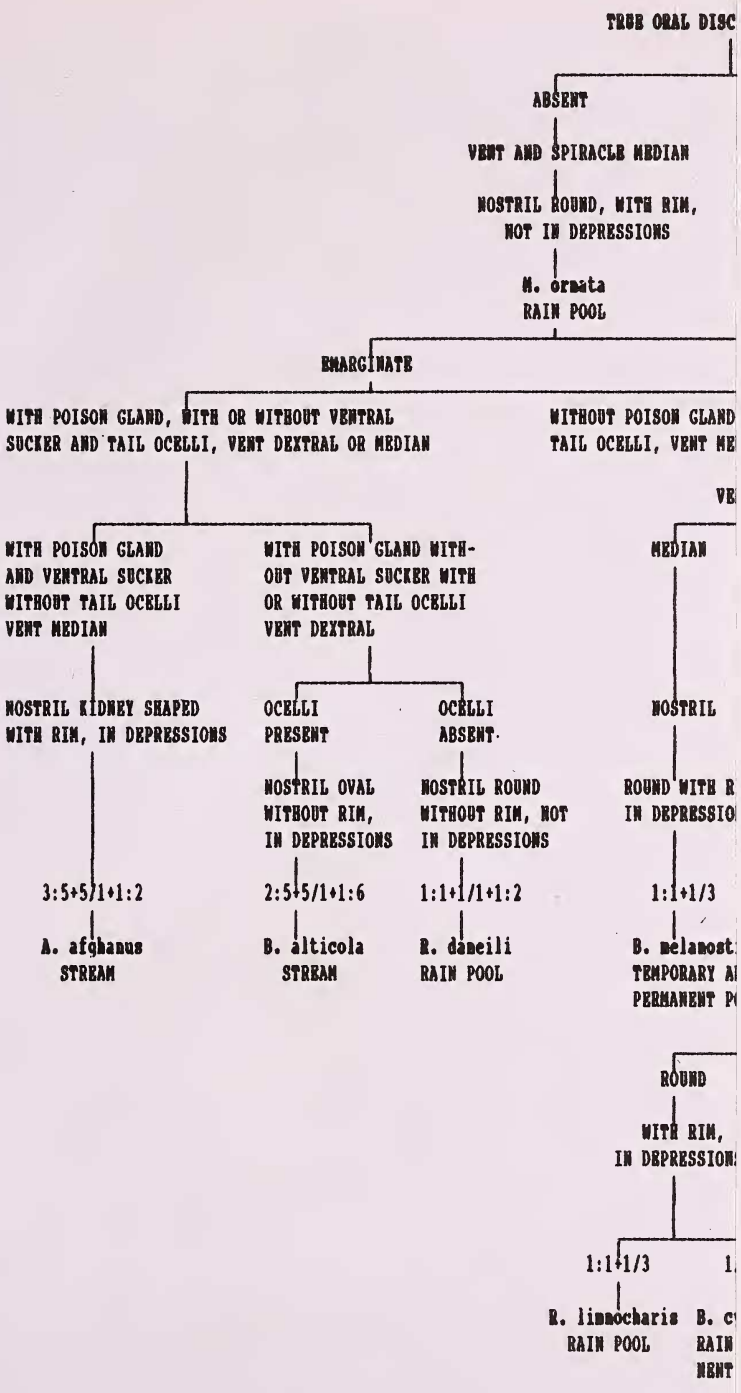


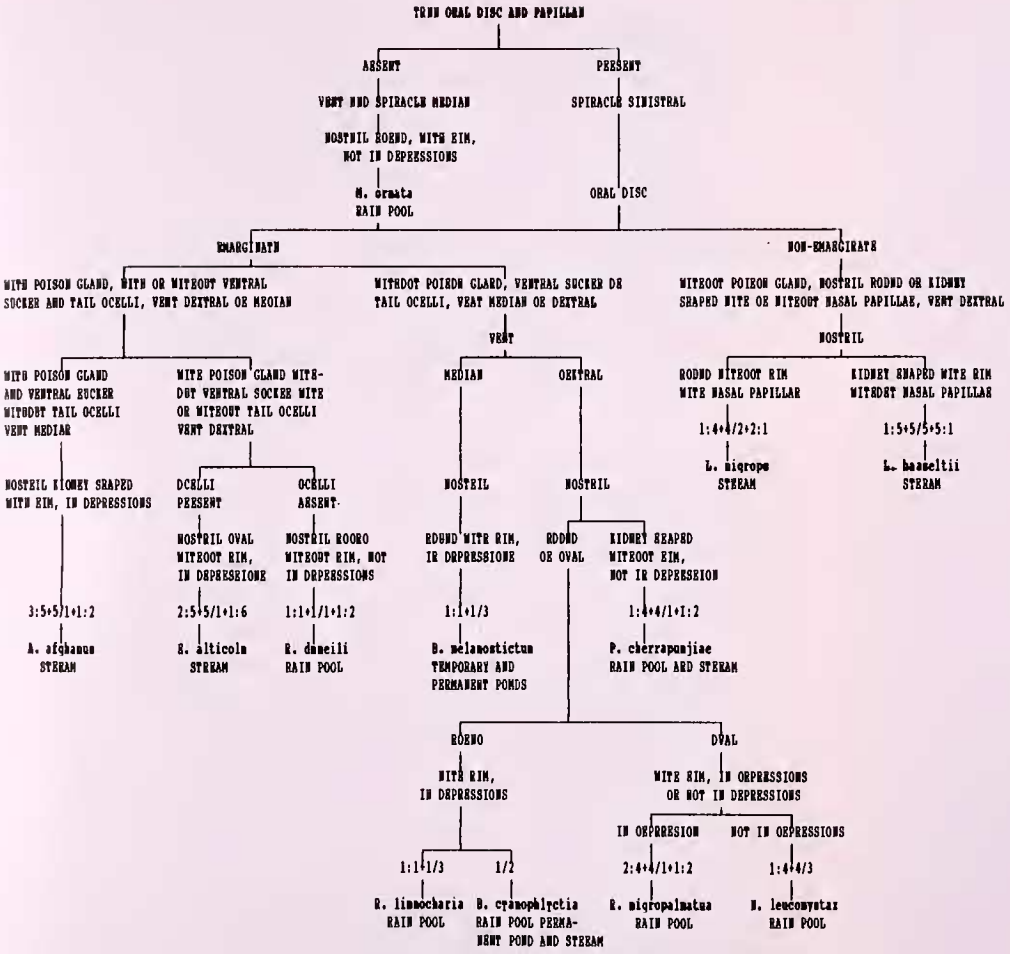
Map. 1. Map of Meghalaya : Places of collection of Anuran larvae and adults.

TABLE 1
DETAILS OF TADPOLES COLLECTION

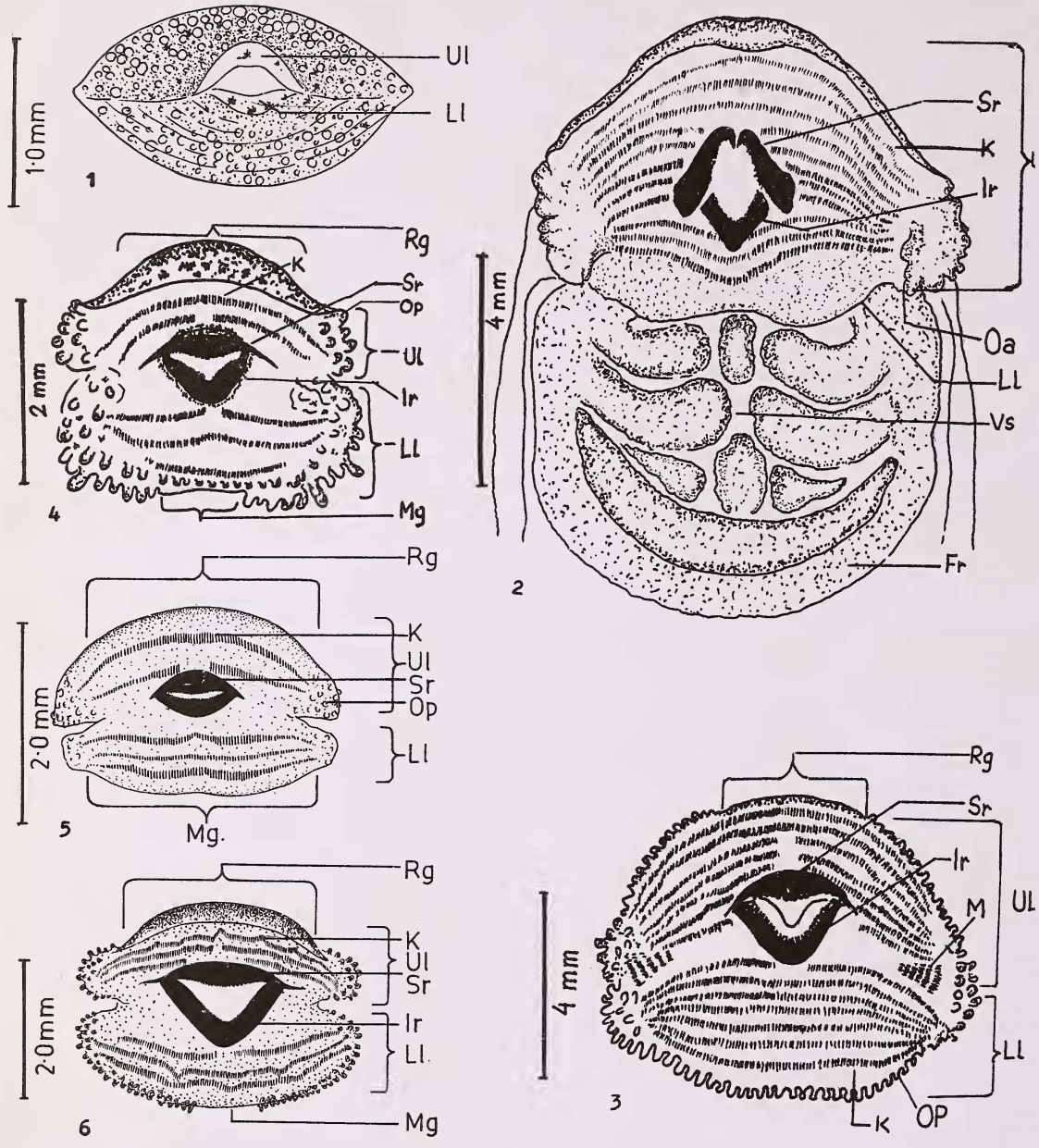
No.	Species	State	Place of collection	Type of habitats	Altitude (m) ASL	Distance (km) from Shillong
1.	*L. hasselti*	Meghalaya	**Khasi hills**			
			i) Lailad	Slow stream	296	65.00
			ii) Sumer	-do-	1200	35.00
			Garo Hills			
			i) William nagar	-do-	1000	350.00
2.	*L. nigrops*	-do-	**Khasi Hills**			
			i) Mawkdok	-do-	1225	24.00
			ii) Nonghtymmai	-do-	1520	8.00
3.	*B. melanostictus*	-do-	**Khasi Hills**			
			i) Mawpun	Pond	1225	24.00
			ii) Nongthymmai	Pond	1520	8.00
4.	*R. alticola*	-do-	**Khasi Hills**			
			i) Barapani	Stream	1250	20.00
			Jaintia Hills			
			i) Thadlaskein	Pond (permanent)	1340	40.00
			ii) Jowai	-do-	1350	55.00
			Garo Hills			
			i) William nagar	Stream	1000	350.00
5.	*R. danieli*	-do-	**Khasi Hills**			
			i) Umling	Swamp	290	65.00
			ii) Kyrdemkulai	Stream	1200	30.00
			Garo Hills			
			i) Tasek	Stream	1400	323.00
6.	*R. limnocharis*	Meghalaya	**Khasi Hills**			
			i) Golf link	Temporary pond	1515	6.00
			ii) Pologround	-do-	1515	5.00
			iii) Nongthymmai	-do-	1515	8.00
			iv) Pynursla	-do-	1350	75.00
7.	*R. cyanophlyctis*	-do-	**Khasi Hills**			
			i) Golf link	-do-	1515	6.00
			ii) Pologround	-do-	1515	5.00
8.	*A. afghanus*	-do-	**Khasi Hills**			
			i) Umling	Rapid stream	1515	1.5
			ii) Cherapunji	-do-	1337	45.00
			iii) Pynursla	-do-	1350	75.00
9.	*P. cherrapunjiae*	-do-	**Khasi Hills**			
			i) Pynursla	Slow stream	1350	75.00
			ii) Cherrapunji	-do-	1337	45.00
10.	*R. leucomystax*	-do-	**Khasi Hills**			
			i) Lynngkyrdam	Temporary pond	1350	58.00
11.	*R. nigropalmatus*	-do-	**Khasi Hills**			
			i) Mawsynram	-do-	1305	45.00
			ii) Cherrapunji	-do-	1337	45.00
12.	*M. ornata*	Assam	Barpeta	Temporary pond	50	200.00



FIELD KEY TO THE 12 TADPOLES INV

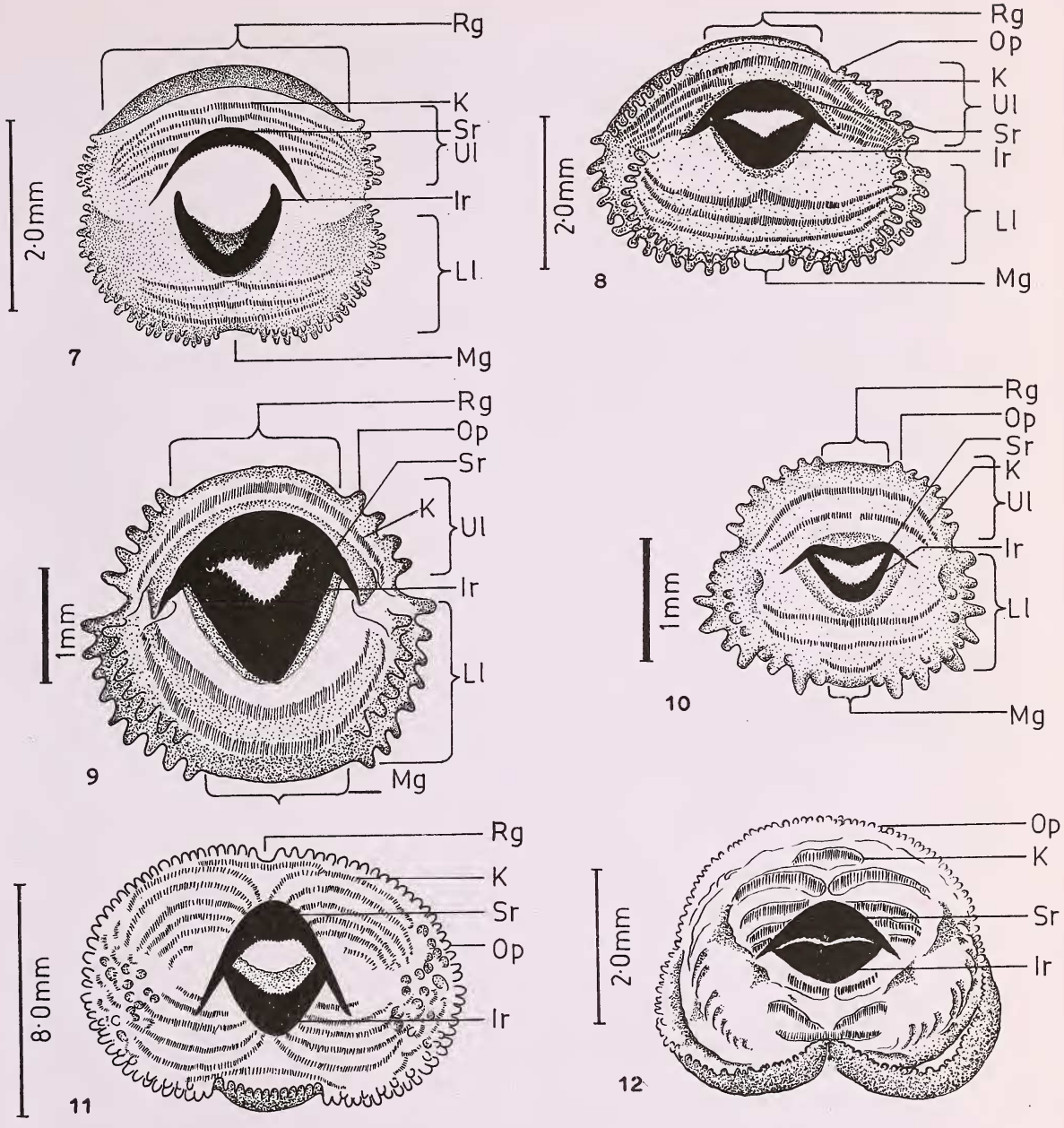


FIELD KEY TO THE 12 TADPOLES INVESTIGATED FROM N.E. HILLS OF INDIA



Figs. 1-6. Oral discs of tadpoles: 1. *Microphyla ornata* (Dum. & Bibr.); 2. *Amolops afghanus* (Gunther); 3. *Rana alticola* Boulenger; 4. *Rana danieli* Pillai & Chanda; 5. *Bufo melanostictus* Schneider; 6. *Philautus cherrapunjiae* Roonwal & Kripalani.

Abbreviations: Fr - Free rim of the ventral sucker; Ir - Infra-rostrodont; K - Keratodont row; Ll - Lower labium; M - Marginal tee Mg - Mental gap; Oa - Oral angle; Op - Oral papillae; Rg - Rostral gap; Sr - Supra-rostrodont; Ul - Upper labium; Vs - Ventral sucker.



Figs. 7-12. Oral discs of tadpoles: 7. *Rhacophorus nigropalmatus* Boulenger; 8. *Rhacophorus leucomystax* (Kuhl); 9. *Rana cyanophlyctis* Schneider; 10. *Rana limnocharis* Weigmann; 11. *Leptobrachium hasselti* Tschudi; 12. *Leptobrachium nigrops* Berry & Hendrickson.

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